ZWEIFEL, RICHARD G. 1967. *Eleutherodactylus augusti.* Catalogue of American Amphibians and Reptiles, p. 41.

Eleutherodactylus augusti (Dugès)
Barking frog

Hylodes laticeps (*non* Duméril, 1853): Dugès, 1869:145. First mention of species later described as *H. augusti.*

Hylodes augusti Dugès, *in* Brocchi, 1879:21. Type-locality, "M. Dugès l'a Trouvé à Guanajuato (Mexique)." According to Smith and Necker (1943:201), "The original description was apparently based upon three cotypes, none of them now extant in [the Alfredo Dugès Museum in] Guanajuato. They are replaced by another specimen, marked 'type' by Dugès, 'trouvé à plus de 40^{m}. de profondeur dans la mine du Cedro, Guanajuato (Juin).' This specimen is designated neotype." Smith and Taylor (1948: 64), however, stated that a skeleton in the Dugès Museum is the type (not examined by author). This agrees with the statement by Mocquard (1899:161) that Dugès had sacrificed the type for the sake of a prepared skeleton.

Eleutherodactylus augusti: Stejneger and Barbour, 1917:34. A footnote, apparently the first use of this combination.

H. [*ylodes*] *latrans*: Nieden, 1923:423. Priority given to *Lithodytes latrans* (Cope *in* Anon., 1878, a *nomen nudum*) and *augusti* considered a synonym.

• CONTENT. Four subspecies are recognized: *augusti, cactorum, fuscofemora* and *latrans.* See Zweifel, 1956, for monographic treatment.

• DEFINITION. This *Eleutherodactylus* is characterized by an intertympanic dermal fold, strongly defined ventral disc, large supernumerary tubercles on soles and palms, and tips of digits that are bulbous but are not strongly dilated and lack transverse grooves. The body size is moderately large for this genus: males of three races attain a snout-vent length of almost 70 mm, and females of *latrans* reach 94 mm.

• DESCRIPTIONS. Zweifel (1956) described external morphology and treated variation in color pattern and in some features of morphology. Detailed descriptions of individual specimens were given by Taylor ("1938" [1939], type description of *cactorum*; 1942, type description of *bolivari*) and Kellogg (1932:101; *cactorum*). Wright and Wright (1949) described the colors in life of adult and half-grown *latrans*; Duellman (1961:37) described a juvenile *cactorum.* Piatt (1934) dealt with features of the skeletal anatomy of *latrans* pertinent to its generic relationships. Goin (1959) reported the number of maxillary teeth in *latrans.*

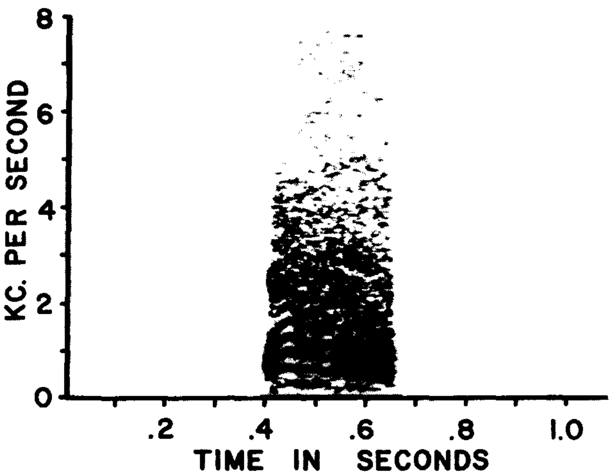
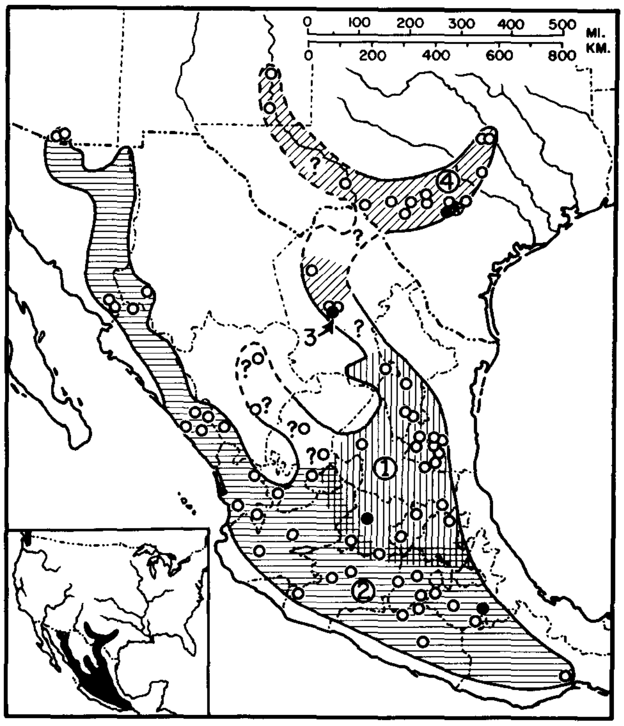


FIGURE. Audiospectrogram (narrow band, 45 cycles per second) of call of *Eleutherodactylus augusti*: Bandera Co., Texas, 12 April 1954, air 18–21°C (courtesy of W. F. Blair). Call rate 40 "barks" per minute, each lasting 0.27 (0.24–0.28) sec. (Fouquette, 1960).

• ILLUSTRATIONS. For photographs of individuals of the four subspecies, including the type-specimen of *fuscofemora*, see Zweifel (1956). Brocchi (1882, pl. 16) illustrated *augusti* in color, and Mocquard (1899, fig. 2) showed the ventral disc. The type-specimens of *cactorum* and *bolivari* (= *cactorum*) were illustrated by drawings in papers by Taylor ("1938" [1939] and 1942). See Taylor and Smith (1945, pl. 24) for photographs of *cactorum* from Guerrero, Stebbins (1951, pl. 14) for a drawing of *cactorum* from Sonora, and Bezy *et al.* (1966, fig. 1) for a photograph of *cactorum* from Arizona. Photographs of *latrans* showing the distinctive juvenile color pattern (also seen in other races) and the adult were given by Wright and Wright (1949, pls. 79, 80). Conant (1958, pl. 38) illustrated *latrans* in color and Blair (1957, fig. 3-45) presented a black-and-white photograph. See Dickerson (1906, pl. 2 and figs. 186–188) for photographs (one in color) of a subadult topotype of *latrans.*

• DISTRIBUTION. *Eleutherodactylus augusti* ranges from the Isthmus of Tehuantepec in southern Mexico northward to Texas, New Mexico, and Arizona. It is found from near sea level in Sinaloa to 2700 meters (8900 ft.) in México (11 km north of Toluca, American Mus. Nat. Hist. 69498–501), though evidently not usually present at low elevations. Apparently *E. augusti* invades the arid central plateau of Mexico only on the east and south. The range in Texas follows the Edwards Plateau from the vicinity of Waco southward and westward to near the mouth of the Pecos River (15.4 miles north of Comstock, Val Verde County, Michael Devine, pers. comm.). A record west of the Pecos River in Terrell County (Scudday, 1965) falls in the extensive gap between the Edwards Plateau, where there are many records for the species, and the two isolated localities in southeastern New Mexico (Koster, 1946; Wm. Degenhardt, *in litt.*, 10 mi. E, 1 mi. S Roswell, Chaves County). Only two specimens of *augusti* have been taken in Arizona: one reported by Slevin (1931) from Madera Canyon, Santa Rita Mountains, Santa Cruz County, and the second found by Bezy *et al.* (1966) in the Pajarito Mountains, Santa Cruz County.



MAP. Solid symbols mark type localities, open symbols indicate other records. Question marks indicate records unassignable to subspecies and other uncertainties in distribution. The star indicates a fossil locality.

Locality records additional to those mentioned above and those published by Zweifel (1956) are in papers by Anderson and Lidicker (1963, Aguascalientes), Chrapliwy, Williams, and Smith (1961, Coahuila), Davis and Dixon (1965, Guerrero), Duellman (1961, Michoacán), McDiarmid (1963, Nayarit), Webb (1958, Coahuila), and Webb and Baker (1962, Durango). Specimens in the Museum of Natural History, University of Kansas, attest the presence of this species at La Bufa and Urique in the Barranca Region of Chihuahua.

The limits of distribution of *E. augusti* are difficult to determine, and except where the range edge coincides with the well-marked escarpment of the Edwards Plateau in Texas, must be considered as inadequately known. Presumably the ecological requirements include a substratum in which fissures or caves develop and an annual rainfall somewhat greater than that characteristic of extreme desert regions. Other factors undoubtedly are involved. For example, on the Mexican Plateau *augusti* is found at much higher elevations than in the Sierra Madre Occidental, where it is replaced by the closely related species *E. tarahumaraensis.*

• FOSSIL RECORD. Mecham ("1958" [1959]:18) identified a scapula from Friesenhahn Cave, 21 miles north of San Antonio, Bexar County, Texas, as probably of this species, adding that it "suggests a frog which would fall on the upper size limit" of *E. a. latrans.* The cave deposits are considered to represent "one or more stages of the Wisconsin in the late Pleistocene."

• PERTINENT LITERATURE. Martin (1958:52–53) stressed the dependence of *Eleutherodactylus a. augusti* on rocky situations and independence of particular plant formations. Davis and Dixon (1957) found *E. a. augusti* calling from the shelter of water-worn galleries inside limestone boulders, and Chrapliwy *et al.* (1961) found *E. a. fuscofemora* calling from holes in the ground. Bezy *et al.* (1966) described the habitat in Arizona, and Davis and Dixon (1965) briefly noted the habitat in Guerrero. Many authors (*e.g.* McAlister, 1954; Olson, 1959; Smith and Van Gelder, 1955; Brocchi, 1882) remarked on the presence of this species in caves. McAlister (1954) recorded invertebrates and other species of amphibians found in a cave with *E. a. latrans.* The field notes of Léon Diguet as quoted by Mocquard (1899:160) are the only published evidence that *augusti* sometimes may be arboreal. Stebbins (1951:222) repeated an English translation of this account first published by Kellogg (1932:102). Strecker (1910) attributed larvae of *Pseudacris* to *Eleutherodactylus.* This confusion was not fully resolved until Jameson (1950) demonstrated that *augusti* lays its eggs in terrestrial situations and has direct development. Valett and Jameson (1961) reported on the embryology in greater detail. McAlister (1954) counted 76 ovarian eggs five mm in diameter in one frog. McAlister (1954) and Olson (1959) mentioned the food habits of *E. a. latrans* (crickets in captivity, camel crickets and land snails). Jameson (1954) discussed social patterns in *latrans* with particular reference to vocalization. Brattstrom (1963) recorded body temperatures of *E. a. latrans* found in caves.

• REMARKS. Strecker (1910) confused a *Pseudacris* (later named *P. streckeri*) with *Eleutherodactylus*; evidently all his remarks apply to the former (Wright and Wright, 1949:280).

• ETYMOLOGY. The specific name *augusti* honors August Duméril, noted French herpetologist of the 19th Century. The name *latrans* comes from the Latin *latro*, to bark, and undoubtedly alluded to the call of the frog. Another meaning of *latro* is "a robber"; application of this inappropriate translation presumably is responsible for the common name "robber frog" sometimes given to this species and extended even to the entire family Leptodactylidae (Wright and Wright, 1949: xi). Taylor collected the type-specimen of *cactorum* in a cactus patch. The name *fuscofemora* refers to the principal diagnostic character of the subspecies, and comes from the Latin *fuscus* (brown, dark, dusky) and *femur* (thigh).

1. *Eleutherodactylus augusti augusti* (Dugès)

Hylodes augusti Dugès, *in* Brocchi, 1879:21. See species account.
Eleutherodactylus latrans: Smith and Taylor, 1948:63. Part, record for San Luis Potosí.
Eleutherodactylus augusti augusti: Zweifel, 1956:14. First use of trinomial.

• DEFINITION. The dorsal coloration is usually dark purplish gray in preservative; the dorsal surface of the thigh has three or four dark bars. The tympanum is large, tympanum diameter/head width averages 0.19 (0.17–0.22) in adult males and 0.18 (0.17–0.19) in adult females. The maximum size of males is less than 70 mm snout to vent.

2. *Eleutherodactylus augusti cactorum* Taylor

Hylodes augusti: Mocquard, 1899:160.
Eleutherodactylus augusti: Slevin, 1931:140. Specimen from Arizona.
Eleutherodactylus cactorum Taylor, "1938" [1939]:391. Type-locality, "km. 226, 20 miles northwest of Tehuacán, Puebla [Mexico]." Holotype, Field Mus. Nat. Hist. 100021 (formerly E. H. Taylor-H. M. Smith 6383), adult female collected by E. H. Taylor, 30 August 1936 (not seen by author).
Eleutherodactylus bolivari Taylor, 1942:298. Type-locality, "Ixtapan del Oro, México, México." Holotype, University of Illinois Mus. Nat. Hist. 15968 (formerly E. H. Taylor-H. M. Smith 29564), male (subadult?) collected by C. Bolivar Pieltain, 11 June 1941 (examined by author).
Eleutherodactylus augusti cactorum: Zweifel, 1956:20. First use of trinomial.

• DEFINITION. This race is similar to *E. a. augusti* in size and in pigmentation but has relatively smaller ears: tympanum diameter/head width averages 0.16 (0.15–0.17) in males and 0.15 (0.13–0.17) in females.

3. *Eleutherodactylus augusti fuscofemora* Zweifel

Eleutherodactylus latrans: Schmidt and Owens, 1944:99.
Eleutherodactylus augusti fuscofemora Zweifel, 1956:24. Type-locality, "Sacaton, 5 miles south of Cuatro Ciénegas, Coahuila, Mexico." Holotype, Field Mus. Nat. Hist. 48132, collected 21 August 1939 by Edward G. Marsh.

• DEFINITION. The dorsal ground color in preservative is light brown, there are no conspicuous dark crossbars on the thigh and the posterior surface of the thigh is largely dark brown in contrast to the light ground color of the anterior side.

• REMARKS. Webb (1958) reported specimens referable to both *latrans* and *fuscofemora* from about 80 miles northwest of the type-locality of *fuscofemora* and recorded typical *latrans* from only nine or 10 miles east of the type-locality. Chrapliwy, Williams, and Smith (1961) referred specimens from about six miles northwest of the type-locality to *fuscofemora.* The color pattern of typical *fuscofemora* may occur in a large part of the population only near Cuatro Ciénegas and may appear elsewhere only occasionally. The high degree of endemism among vertebrates in the region of Cuatro Ciénegas lends interest to the problem.

4. *Eleutherodactylus augusti latrans* (Cope)

Lithodytes latrans Cope, 1880:25. Type-locality, Helotes, Bexar County, Texas. Possible syntypes include United States Nat. Mus. 10058 (2 specimens), 10529 (2 specimens) and 10751–53 (Cochran, 1961:65) and Acad. Nat. Sci. Philadelphia 10757–58 (Piatt, 1934:90), all collected by G. W. Marnock; see remarks (not seen by author).
Hylodes augusti: Mocquard, 1899:160. *L. latrans* considered a synonym of *H. augusti.*
Hylodes latrans: Günther, 1901:241. Transfer of *L. latrans* to *Hylodes.*
Eleutherodactylus latrans: Stejneger and Barbour, 1917:34. Transfer of *H. latrans* to *Eleutherodactylus.*
Eleutherodactylus augusti latrans: Zweifel, 1956:17. First use of trinomial.

• DEFINITION. The dorsal ground color in preservative is light brown, there are dark crossbars on the anterior surface of the thigh, and the posterior side of the thigh is not markedly darker than the anterior. This is the largest race of *E. augusti*: males commonly exceed 70 mm snout to vent, and females reach 94 mm.

• REMARKS. The name *latrans* first appeared in an anonymous note in the March 1878 issue of *The American Naturalist* (p. 186): "G. W. Marnock has recently discovered in southwestern Texas a new species of the genus *Lithodytes*, which Prof. Cope calls *L. latrans*." This is a *nomen nudum* and the

name must date from Cope's formal description (1880). Which specimens are the true syntypes of *latrans* is in question. In the original description, Cope did not mention how many specimens he had. In 1889 Cope repeated this description verbatim but added a paragraph indicating that additional specimens received from Mr. Marnock showed that the species attained a larger size than the 76 mm length of head and body stated in the original description. Two specimens, USNM 10058, measure 83 and 89.5 mm (Cochran, *in litt.*), so may not be syntypes. Three others, USNM 10751–53, were collected on February 10, 1880, so could not have been available to Cope in 1878 when the species was first mentioned in print, but they may have been received by Cope in time for study prior to publication of the description in 1880. Dates of collection of the other supposed syntypes are not on record.

Comment

John D. Lynch (*in litt.*) finds that specimens from the western part of the range of *E. a. cactorum* are not so distinct from *E. a. augusti* as is *cactorum* in the southern part of its range. Perhaps *cactorum* does not deserve recognition, but possibly when more specimens become available from regions previously unsampled or poorly sampled it may be desirable to recognize additional subspecies. For example, three specimens (Amer. Mus. Nat. Hist. 74440–42) collected by R. G. Webb about 6.5 mi. WSW Cd. Durango, Durango, closely resemble *cactorum* in tympanum size but are much larger, equaling or even exceeding (♂ 81 mm snout-vent length) *latrans* in size. The color pattern is more like that of *latrans* than *cactorum*. A specimen (Mich. State Univ. 4128) from 4 mi. SE EL Casco in north-central Durango, well outside the previously known range of the species, unfortunately was lost in the mail before I could examine it.

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